
The Study of Occurrence of Polycyclic Aromatic Hydrocarbons in Sediments of Sebasthian Canal and Hamilton Canal of Sri Lanka.

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Polycyclic Aromatic Hydrocarbons (PAHs) are known as a major group of organic pollutants which are considered as toxic, mutagenesis and carcinogenic. These PAHs composed of two or more aromatic benzene rings are produced due to incomplete combustion of fossil fuels; such as coal, oil and due to pyrolytic processes. Since PAHs are harmful towards living beings, studies on monitoring PAHs have been conducted in different parts of the world. The canals, Sebasthian Canal and Hamilton Canal are in close proximity to Kelanitissa Power Station (KL) and Kerawalapitiya Power Station (KW) respectively were subjected to this study. A preliminary study has been conducted to determine the occurrence of PAHs in water bodies of these two canals. For the purposes of water quality monitoring, qualitative and quantitative studies of sediment has a significant importance. This study aims to determine the type and concentration of PAHs in sediment of the above water bodies near the two power plants. Occurrence of PAHs in sediment is expected since these are diesel fuel fired combined cycle power stations and the preliminary study has shown accumulation of PAHs in surface water of the water body.

Studies have shown PAHs in water bodies vary with the seasonal variation. The sediment samples were collected during the dry season in which the reported PAHs of water bodies are high. The sediment samples at a thickness of 2.5 – 5.0 cm along with soil were collected during dry season. The reference study was conducted from sediment collected from a fresh water spring in Bandarawela, which is approximately 180 km away from the study area where anthropogenic influence is very low. The samples were sonicated using ultra-sonicator for 1 hour at 50 °C to extract PAHs. Methanol extract was cleaned using silica gel (60-120 Mesh) column. Identification and quantification of PAHs in sediment samples were carried out using HPLC at 254 nm and HPLC-FLD (excitation at 250 nm, emission at 410 nm).

Identified PAHs contained both low and medium molecular weight PAHs. Naphthalene, acenaphthene, fluoranthene, pyrene, Benz[a]anthracene and chrysene were the major PAHs present in the sediments. The total measured PAHs in sediment ranged from 1.53 to 3.89 $\mu\text{g kg}^{-1}$ in KL site and from 0.68 to 21.60 $\mu\text{g kg}^{-1}$ in KW site, which is a significant increment than that of its reported measured total PAHs values in surface water. (PAHs in surface water of Sebastian canal varied from 0.11 $\mu\text{g L}^{-1}$ to 1.71 $\mu\text{g L}^{-1}$ where as it varied from 0.16 $\mu\text{g L}^{-1}$ to 2.74 $\mu\text{g L}^{-1}$ in surface water of Hamilton canal.) Therefore, it verifies that, for purposes of water quality monitoring, qualitative and quantitative studies of sediment has a significant importance. Further studies should be carried out to identify the source of PAHs into these water bodies.

Keywords: PAHs, Priority pollutants, Sediment, Polycyclic Aromatic Hydrocarbons

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